BOBBY JINDAL
GOVERNOR

HAROLD LEGGETT, PH.D.
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

Certified Mail No.

Agency Interest (AI) No. 126578
Activity No. PER20070008

Mr. David V. Wise
Plant Manager
PO Box 358
Addis, LA 70710-0358

RE: Prevention of Significant Deterioration (PSD) Permit, PSD-LA-731 Shintech Louisiana LLC – Shintech Plaquemine Plant 2 (SPP-2)
Shintech Louisiana LLC, Plaquemine, Iberville Parish, Louisiana

Dear Mr. David V. Wise:

Enclosed is your permit, PSD-LA-731. Construction of the proposed project is not allowed until such time as the corresponding Part 70 Operating Permit is issued.

Should you have any questions, contact Anthony Randall of the Air Permits Division at (225) 219-3151.

Sincerely,

Cheryl Sonnier Nolan
Assistant Secretary

_____
Date

CSN:ALR

c: US EPA Region VI

Agency Interest No. 126578

PSD-LA-731

AUTHORIZATION TO CONSTRUCT AND OPERATE A NEW FACILITY PURSUANT TO THE PREVENTION OF SIGNIFICANT DETERIORATION REGULATIONS IN LOUISIANA ENVIRONMENTAL REGULATORY CODE, LAC 33:III.509

In accordance with the provisions of the Louisiana Environmental Regulatory Code, LAC 33:III.509,

Shintech Louisiana LLC
PO Box 358
Addis, LA 707100358

is authorized to construct the facility at the Shintech Louisiana LLC - Plaquemine PVC Plant near

26270 Highway 405 River Road South
Plaquemine, Iberville Parish, Louisiana

subject to the emissions limitations, monitoring requirements, and other conditions set forth hereinafter.

This permit and authorization to construct shall expire at midnight on _____, 2010, unless physical on-site construction has begun by such date, or binding agreements or contractual obligations to undertake a program of construction of the source are entered into by such date.

Signed this _____ day of _____, 2008.

Cheryl Sonnier Nolan
Assistant Secretary
Office of Environmental Services
Louisiana Department of Environmental Quality

BRIEFING SHEET

Shintech Louisiana LLC – Shintech Plaquemine Plant 2
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731

PURPOSE

To obtain a PSD permit for the Shintech Plaquemine Plant 2 (SPP-2).

RECOMMENDATION

Approval of the proposed permit.

REVIEWING AGENCY

Louisiana Department of Environmental Quality, Office of Environmental Services, Air Permits Division

PROJECT DESCRIPTION

Shintech proposes to construct a 1.81 billion lbs/year PVC production plant south of Plaquemine. The facility will consist of a Chlor-Alkali Unit and an EDC/VCM Unit. The Chlor-Alkali Unit will purify and electrolyze brine to produce chlorine, hydrogen and caustic solution. Chlorine from the Chlor-Alkali Unit will be combined with supplied ethylene to produce ethylene dichloride (EDC), which is then converted to vinyl chloride monomer (VCM). VCM is then sent to railcar loading, marine loading, or to the PVC Unit. The PVC Unit will utilize the suspension polymerization process to polymerize VCM in water to produce PVC slurry which is stripped of unreacted VCM, filtered to remove water, dried, sieved and sent to storage. Permitted emissions from the facility in tons per year are as follows:

Pollutant	Emissions	PSD de minimis	Review required?
PM_{10}	27.74	15	Yes
SO_2	2.72	40	No
NO_X	44.15	40	Yes
CO	179.45	100	Yes
VOC	32.40	N/A	No

TYPE OF REVIEW

Particulate matter (PM_{10}), nitrogen oxide (NO_X), and carbon monoxide (CO) emissions from the proposed facility will be above PSD significance levels. Therefore, the requested permit was reviewed in accordance with PSD regulations for PM_{10}, NO_X, and CO emissions. Emissions of LAC 33:III.Chapter 51-regulated toxic air pollutants (TAP) have been reviewed pursuant to the requirements of the Louisiana Air Quality Regulations.

BRIEFING SHEET

Shintech Louisiana LLC – Shintech Plaquemine Plant 2
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731

BEST AVAILABLE CONTROL TECHNOLOGY

PM_{10}, NO_X, and CO emissions are above PSD significance levels and must undergo PSD analyses. The selection of control technology was based on the BACT analysis using a "top down" approach and included consideration of control of toxic materials.

Control of PM_{10} and CO emissions were analyzed using a "top down" approach. Good design and maintenance, good combustion practices, and burning gaseous fuels were determined as BACT for PM_{10} and CO emissions from affected equipment at the proposed plant.

Shintech will utilize good combustion practices, low NO_X burners (LNB), flue gas recirculation (FGR), and selective catalytic reduction (SCR) to control NO_X emissions to a degree equivalent to the Lowest Achievable Emission Rates (LAER) to fulfill BACT requirements of the PSD program.

AIR QUALITY IMPACT ANALYSIS

Prevention of Significant Deterioration regulations require an analysis of existing air quality for those pollutants emitted in significant amounts from a proposed facility.

This modeling analysis was conducted for PM_{10}, CO, and NO_2. For those pollutants to be modeled, the impacts due to the contemporaneous net increase from the project (in this case, the entire allowable emission rates) were modeled to determine if the emissions increase results in a significant impact. Therefore the resulting concentrations were compared to corresponding modeling significance level (MSL) for each pollutant modeled and the corresponding average period.

Modeled concentrations of PM_{10}, CO and NO_2 for each averaging period were less than the MSL; therefore, a full impact analysis was not required.

The toxics air quality dispersion modeling analysis was conducted in accordance with the approved air quality dispersion modeling protocol. Vinyl chloride modeling results show that there were nine receptors with ambient air impacts greater than the AAS. The receptors are located along Evergreen Road and at a restricted public access cemetery located off Evergreen Road to the East of the Georgia Gulf Facility.

The vinyl chloride AAS is based on an annual average. Since the receptor locations are in areas that are uninhabited and restricted access, long-term exposure to vinyl chloride is not expected. Additionally, modeling results show that the Shintech facility's contributions to the vinyl chloride inpacts are relatively minor. A neighboring facility's vinyl chloride contributions to the nine receptors make up a significant portion of the predicted concentrations.

BRIEFING SHEET

Shintech Louisiana LLC – Shintech Plaquemine Plant 2
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731

ADDITIONAL IMPACTS

Soils, vegetation, and visibility will not be adversely impacted by the proposed facility, nor will any Class I area be affected. The project will not result in any significant secondary growth effects. Approximately 100 new permanent jobs will be created.

PROCESSING TIME

Application Dated:	November 14, 2007
Application Received:	November 15, 2007
Additional Information Dated:	February 12, 2008, February 27, 2008
Effective Completeness Date:	February 29, 2008

PUBLIC NOTICE

A notice requesting public comment on the proposed project was published in *The Advocate*, Baton Rouge, Louisiana, on <<Date>>, 200x; and in <<*Local Paper*>>, <<City>>, Louisiana, on <<Date>>, 200x. Copies of the public notice were also mailed to individuals who have requested to be placed on the mailing list maintained by the Office of Environmental Services on <<Date>>, 200x. A proposed permit was also submitted to U.S. EPA Region VI on <<Date>>, 200x. All comments will be considered prior to a final permit decision.

PRELIMINARY DETERMINATION SUMMARY

Shintech Louisiana LLC – Shintech Plaquemine Plant 2
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731
February 29, 2008

I. APPLICANT

Shintech Louisiana LLC
PO Box 358
Addis, LA 707100358

II. LOCATION

Shintech Louisiana LLC - Plaquemine PVC Plant will be located at 26270 Highway 405 River Road South, Plaquemine, Louisiana. Approximate UTM coordinates are 675.712 kilometers East and 3350.274 kilometers North, Zone 15.

III. PROJECT DESCRIPTION

Shintech Louisiana, LLC (Shintech), a wholly owned subsidiary of C-K Tech, Inc., is currently constructing Shintech Plaquemine Plant (SPP) on the west bank of the Mississippi River near Plaquemine, Louisiana in Iberville Parish. The current construction includes the following units:

- Utilities
- Chlor-Alkali (C/A) Unit
- Vinyl Chloride (VCM) Unit
- Polyvinyl Chloride (PVC) Unit

SPP is authorized under Title V Permit No. 1280-00118-V0 and PSD Permit No. PSD-LA-709 issued on July 27, 2005.

Shintech proposes a new project to construct and operate Shintech Plaquemine Plant 2 (SPP-2) at the same site.

Chlor-Alkali Unit

The Chlor-Alkali (C/A Unit) will use an ion exchange membrane process to produce chlorine (Cl_2), Hydrogen (H_2), and sodium hydroxide (NaOH). The ion exchange membrane process does not use mercury or asbestos. The process reaction is an electrolytic reaction that converts salt solution to CL_2 as follows:

$$2NaCl + 2H_2O + \text{electricity} \rightarrow Cl_2 + H_2 + 2NaOH$$

PRELIMINARY DETERMINATION SUMMARY

Shintech Louisiana LLC – Shintech Plaquemine Plant 2
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731
February 29, 2008

Raw salt brine is brought to the plant through a pipeline and stored in a tank. The brine is crystallized in an evaporator and purified by ion exchanging resin. The purified brine is sent to the electolyzer. Direct electric current is applied. The anode and cathode are separated by a membrane to prevent the caustic soda from reacting with the chlorine. Cl_2 produced at the anode is cooled and sent to the Vinyl Chloride Monomer (VCM) unit as raw material. H_2 produced at the cathode is dehumidified and sent to other facilities including the boilers. A portion of chlorine and hydrogen gases is converted to hydrochloric acid for internal use. The lean caustic soda produced at the cathode is concentrated in an evaporative process to produce commercial grade caustic soda. Emissions from process equipment are controlled by absorbers.

VCM Unit

Ethylene is brought to the plant through pipeline. Chlorine is supplied by the C/A Unit. Ethylene is combined with Cl_2 in a direct chlorination reactor to form Ethylene Dichloride (EDC) as follows:

$$C_2H_4 + Cl_2 \rightarrow C_2H_4Cl_2$$

Crude EDC is purified and sent to cracking furnaces through storage tanks. The cracking furnaces provide heat to crack EDC yielding VCM and hydrogen chloride (HCl) as follows:

$$C_2H_4Cl_2 \rightarrow C_2H_3Cl + HCl$$

The VCM is purified and sent to storage spheres. EDC that was not cracked is sent back to the EDC purification train. HCl is recovered and used in a second EDC formation process called oxyhydrochlorination. The oxyhydrochlorination reaction is as follows:

$$C_2H_4 + 2HCl + \tfrac{1}{2}O_2 \rightarrow C_2H_4Cl_2 + H_2O$$

Approximately 1.81 billion pounds of VCM product will be produced each year. Product VCM is sent to (1) the Polyvinyl Chloride (PVC) Unit, (2) a tank car loading facility for transport, or (3) a marine loading dock for shipment. Pure EDC can be transported through the marine loading dock by ship.

Emissions from process equipment are controlled by thermal oxidizers and nitrogen oxide (NO_X) Control.

The Gas Thermal Oxidizers are equipped with waste heat recovery boilers.

PRELIMINARY DETERMINATION SUMMARY

Shintech Louisiana LLC – Shintech Plaquemine Plant 2
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731
February 29, 2008

Supporting Facilities

Supporting Facilities include bulk truck loading and unloading areas, railcar loading and unloading areas, ship dock area, on-site utilities, steam-generating units, and a wastewater treatment facility (WWTF).

Clean-burning fuels (natural gas and hydrogen) will be used to fire steam generating units (boilers), which are equipped with the low NOx burners (LNB) and selective catalytic reduction (SCR).

The WWTF consists of a biological treatment system, pH adjustment basin, final basin, and sludge dewatering system.

Estimated emissions, in tons per year, are as follows:

Pollutant	Emissions	PSD de minimis	Review required?
PM_{10}	27.74	15	Yes
SO_2	2.72	40	No
NO_X	44.15	40	Yes
CO	179.45	100	Yes
VOC	32.40	50	No

IV. SOURCE IMPACT ANALYSIS

A proposed net increase in the emission rate of a regulated pollutant above de minimis levels for new major or modified major stationary sources requires review under Prevention of Significant Deterioration regulations, 40 CFR 52.21. PSD review entails the following analyses:

A. A determination of the Best Available Control Technology (BACT);

B. An analysis of the existing air quality and a determination of whether or not preconstruction or postconstruction monitoring will be required;

C. An analysis of the source's impact on total air quality to ensure compliance with the National Ambient Air Quality Standards (NAAQS);

D. An analysis of the PSD increment consumption;

E. An analysis of the source related growth impacts;

F. An analysis of source related growth impacts on soils, vegetation, and visibility;

G. A Class I Area impact analysis; and

H. An analysis of the impact of toxic compound emissions.

A. BEST AVAILABLE CONTROL TECHNOLOGY

Under current PSD regulations, an analysis of "top down" BACT is required for the control of each regulated pollutant emitted from a modified major stationary in excess of the specified significant emission rates. The top down approach to the BACT process involves determining the most stringent control technique available for a similar or identical source. If it can be shown that this level of control is infeasible based on technical, environmental, energy, and/or cost considerations, then it is rejected and the next most stringent level of control is determined and similarly evaluated. This process continues until a control level is arrived at which cannot be eliminated for any technical, environmental, or economic reason. A technically feasible control strategy is one that has been demonstrated to function efficiently on identical or similar processes. Additionally, BACT shall not result in emissions of any pollutant which would exceed any applicable standard under 40 CFR Parts 60 and 61.

For this project, BACT analyses are required for PM_{10}, NO_X, and CO emissions from the facility. Where PM_{10} is addressed in the BACT analysis, it is assumed that particulate matter (PM) is also being considered.

BACT analyses for CO and PM_{10}

Utility Boilers EQT0112 and EQT0113 (EPN 2U-1 and 2U-2)

Shintech proposes to install and operate two boilers that will provide heat and steam for the Chlor-Alkali Unit and the VCM Unit. Each boiler will have a maximum heat input rating of 250 MM Btu/hr. Both boilers will fire natural gas. Boilers A and B will also be capable of firing hydrogen up to 250 MM BTU/hr. The boilers will provide heat and steam 8,760 hours per year. Emissions of both PM_{10} and CO are expected from the proposed boilers.

Particulate emissions from natural gas and/or hydrogen combustion are typically low. Particulate matter from natural gas combustion is unburned, high-molecular weight hydrocarbons. Higher particulate matter emissions can result from poor mixing of air and fuel.

The level of CO emissions is dependent on the efficiency of natural gas combustion. Boilers that are poorly designed and/or maintained may have inefficient combustion resulting in higher CO emission rates. Sometimes, NOx control systems such as low NOx burners (LNB) and flue gas recirculation (FGR) may reduce combustion efficiency.

Care must be taken to assure proper combustion when using these control systems. Good combustion practices include:

- Maintaining written operating and maintenance procedures
- Properly trained operating personnel
- Maintaining appropriate fuel-to-air ratio
- Proper design of firebox, fuel handling, sizing, and combustion air and fuel distribution

EPA's RACT/BACT/LEAR Clearinghouse (RBLC) was used to perform a search of all permitted control technologies for natural gas fired boilers of similar size and duty.

Based on the RBLC search results, the following table presents candidate control technologies for natural gas and natural gas/hydrogen fired boilers.

Candidate Control Technology – Natural Gas/Hydrogen Fired Boilers

Pollutant	Control Technology
PM_{10}	Good combustion practices and clean burning fuels
CO	Good combustion practices

Because the above control technology represents the top performing method of controlling PM_{10} and CO emission and there are no outstanding issues regarding collateral environmental impacts, LDEQ determines good combustion practices of clean burning fuels as BACT.

Proposed BACT Emission Limits

Pollutant	Emission Limit
PM_{10}	0.005 lb/MM BTU
CO	0.0362 lb/MM BTU

Cooling Towers EQT0120 and EQT0128 (EPN 2C-4 and 2M-7)

Shintech proposes to install two wet cooling towers of varying sizes. One cooling tower will serve the Chlor-Alkali Unit and one will serve the VCM Unit. The cooling towers function as heat exchangers that dispel unneeded process heat to the atmosphere.

Heat transfer is measured by the decrease in the process temperature and an increase in temperature of the air passing through the cooling tower. Wet cooling towers promote evaporation by providing a large surface area.

Because wet cooling towers provide direct contact between the cooling water and the air passing through the tower, some of the liquid water may be entrained in the air stream and be carried out of the tower as "drift" droplets. Therefore, the particulate matter constituent of the drift droplets may be classified as an emission.

The magnitude of drift loss is influenced by the number and size of droplets produced

within the cooling tower, which in turn are determined by the fill design, the air and water patterns, and other interrelated fators. Tower maintenance and operation can effectively reduce the formation of drift droplets. For example, proper water flow, proper air flow, limited dissolved solids in the water, and properly located drift eliminators can limit drift emissions.

EPA's RACT/BACT/LEAR Clearinghouse (RBLC) was used to perform a search of all permitted control technologies for cooling towers of similar size and duty. Based on the RBLC search results, the following table presents candidate control technologies for cooling towers.

Candidate Control Technology – Wet Cooling Towers

Pollutant	Control Technology
PM_{10}	Good design, maintenance, and use of mist eliminators

Because cooling towers require large surface area and high air flow rates to transfer heat, an add-on air pollution device would be infeasible. Additionally, should a capture system be attached to the air outlet, it would impair the pressure balance and transfer of heat from the system.

Shintech proposes to design and operate the cooling towers using mist eliminators to meet the proposed emission limits in the table below.

Proposed BACT PM_{10} Emission Limits

Unit	Flow Rate	Cycles of Concentration	Total Dissolved Solids	Emission Limit
EQT0120 (2C-4)	38,750 gpm	4	226 mg/L	0.00008 lb/M gal
EQT0128 (2M-7)	106,000 gpm	3	226 mg/L	0.00006 lb/M gal

VCM Cracking Furnaces EQT0122, EQT0123, EQT0124, & EQT0125 (EPN 2M-1, 2M-2, 2M-3, & 2M-4)

Shintech proposes to install and operate four VCM cracking furnaces. Each furnace will have a maximum heat input rating of 90 MM BTU/hr. The furnaces will fire natural gas. The furnaces will operate 8,760 hours per year. Emissions of both PM_{10} and CO are expected from the proposed furnaces.

Particulate matter emissions from natural gas combustion are typically low. Particulate matter from natural gas combustion is unburned, high-molecular weight hydrocarbons. Higher particulate matter emissions can result from poor mixing of air and fuel.

The level of CO emissions is dependent on the efficiency of natural gas combustion. Furnaces that are poorly designed and/or maintained may have inefficient combustion resulting in higher CO emission rates. Sometimes, NOx control systems such as low

NOx burners (LNB) and flue gas recirculation (FGR) may reduce combustion efficiency. Care must be taken to assure proper combustion when using these control systems.

EPA's RACT/BACT/LEAR Clearinghouse (RBLC) was used to perform a search of all permitted control technologies for natural gas fired boilers of similar size and duty. Based on the RBLC search results, the following table presents candidate control technologies for natural gas and natural gas/hydrogen fired boilers.

Candidate Control Technology – Natural Gas/Hydrogen Fired Boilers

Pollutant	Control Technology
PM_{10}	Good combustion practices and clean burning fuels
CO	Good combustion practices

Because the above control technology represents the top performing method of controlling PM_{10} and CO emissions and there are no outstanding issues regarding collateral environmental impacts, LDEQ determines good combustion practices of clean burning fuels as BACT.

Proposed BACT Emission Limits

Pollutant	Emission Limit
PM_{10}	0.007 lb/MM BTU
CO	0.046 lb/MM BTU

Gas Thermal Oxidizers EQT0126 and EQT0127 (EPN 2M-5 & 2M-6)

The Gas Thermal Oxidizers are used to dispose of waste gas combustible organic compounds from the process. The method of disposal is to oxidize organic compounds to carbon dioxide and water. When chlorinated organic compounds are part of the waste gas stream, the products of complete combustion include hydrochloric acid (HCl). The HCL will be removed by an HCl scrubber. Thermal oxidation provides safe, effective, and efficient control of almost any organic stream, provided that it is properly designed and maintained.

The heart of the thermal oxidizers is a nozzle-stabilized flame maintained by a combination of auxiliary fuel (natural gas), waste gas, and supplemental air. Upon passing through the flame, the waste gas is heated from its inlet temperature to its ignition temperature. Any organic stream and air mixture will ignite if its temperature is raised to a sufficiently high level. Therefore, the level of VOC control is determined by the residence time and temperature in the thermal oxidizer combustion chamber.

Pollutants that can be expected from the Gas Thermal Oxidizers include products of combustion, i.e. PM_{10} and NOx, and products of incomplete combustion, i.e. CO and VOC.

Particulate matter emissions from thermal oxidizers depend on the characteristics of the materials being combusted. Shintech will burn only clean burning natural gas and waste gas. Typically, particulate matter is unburned, high-molecular weight hydrocarbons. Particulate matter emission from combustion of natural gas and waste organic vapor streams is minimal. Higher particulate matter emissions can result from poor missing of air and fuel.

The level of CO emissions is dependent on the efficiency of combustion. Thermal oxidizers that are poorly designed and/or maintained may have inefficient combustion resulting in higher CO emission rates.

EPA's RACT/BACT/LAER Clearinghouse (RBLC) was used to perform a search of permitted thermal oxidizers. Based on the RBLC search results, the table below presents candidate BACT for thermal oxidizers.

Candidate Control Technology – Gas Thermal Oxidizers

Pollutant	Control Technology
PM_{10}	Good combustion practices and clean burning fuels
CO	Good combustion practices

Because the above control technology represents the top performing method of controlling PM_{10} and CO emissions and there are no outstanding issues regarding collateral environmental impacts, LDEQ determines good combustion practices of clean burning fuels as BACT.

Proposed BACT Emission Limits

Pollutant	Emission Limit
PM_{10}	0.0077 lb/MM BTU
CO	0.08 lb/MM BTU

Diesel-Fired Emergency Engines EQT0115, 0116, 0121, and 0129 (EPN 2U-5, 2U-6, 2C-6, and 2M-11)

Shintech proposes to install and operate diesel-fired engines that will provide emergency services for the Utilities, Chlor-Alkali, and VCM Units. The engines will be operated for short periods each month for maintenance. Emissions of both PM_{10} and CO are expected from the proposed engines.

Particulate matter from diesel combustion is unburned, high-molecular weight hydrocarbons. Higher particulate matter emissions can result from poor mixing of air and fuel.

The level of CO emissions is dependent on the efficiency of combustion. Engines that are poorly designed and/or maintained may have inefficient combustion resulting in higher CO emission rates. Care must be taken to assure proper combustion. Good

combustion practices include:

- Maintaining written operating and maintenance procedures;
- Properly trained operating personnel;
- Maintaining appropriate fuel-to-air ratio; and
- Proper design, fuel handling, sizing, and combustion air and fuel distribution.

Because the above control technology represents the top performing method of controlling PM_{10} and CO emissions in emergency diesel-fired engines, and there are no outstanding issues regarding collateral environmental impacts, LDEQ determines good combustion practices as BACT.

Proposed BACT Emission Limits

Pollutant	Emission Limit
PM_{10}	Engines < 600 HP: 0.0022 lb/HP-hr Engines > 600 HP: 0.0007 lb/HP-hr
CO	Engines < 600 HP: 0.0067 lb/HP-hr Engines > 600 HP: 0.0055 lb/HP-hr

BACT analyses for NOx

Utility Boilers EQT0112 and EQT0113 (EPN 2U-1 and 2U-2)

Shintech proposes to install and operate two boilers that will provide heat and steam for the Chlor-Alkali Unit and VCM Unit. Each boiler will have a maximum heat input rating of 250 MM BTU/hr. Both boilers will fire natural gas. The boilers will provide heat and steam 8,760 hours per year.
NOx formation occurs by three fundamentally different mechanisms. The principal mechanism of NOx formation in natural gas and hydrogen combustion is thermal NOx. The thermal NOx mechanism occurs through the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most NOx formed through the thermal NOx mechanism occurs in the high temperature flame zone near the burners. The formation of thermal NOx emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas/hydrogen fired boilers. Emission levels vary considerably with the type and size of combustor with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

EPA's RACT/BACT/LAER Clearinghouse (RBLC) was used to perform a search of all nationally permitted control technologies for natural gas and hydrogen fired boilers of similar size and duty. Based on the RBLC search results, the lowest permitted emission rates nationally are:

- 0.07 lb NOx/MM BTU for Hydrogen Combustion Using LNB, FGR, and

Selective Catalytic Reduction (SCR)
- 0.012 lb NOx/MM BTU for Natural Gas Combustion using LNB, FGR, and SCR

Shintech proposes to match or surpass the above emission rates with the following BACT:

- 0.01 lb NOx/MM BTU for Natural Gas/Hydrogen Combustion using LNB and SCR

VCM Cracking Furnaces EQT0122, EQT0123, EQT0124, & EQT0125 (EPN 2M-1, 2M-2, 2M-3, & 2M-4)

Shintech proposes to install and operate four VCM cracking furnaces. Each furnace will have a maximum heat input rating of 90 MM BTU/hr. The furnaces will fire natural gas. The furnaces will operate 8,760 hours per year. Emissions of both NOx and VOC are expected from the proposed furnaces. Post combustion selective catalytic reduction (SCR) will be used to control NOx emissions. SCR is a post-combustion control technology based on the chemical reduction on NOx into molecular nitrogen (N_2) and water vapor (H_2O). A catalyst is used to increase the NOx removal efficiency, which allows the process to occur at lower temperatures.

NOx formation occurs by three fundamentally different mechanisms. The principal mechanism of NOx formation is natural gas and hydrogen combustion is thermal NOx. The thermal NOx mechanism occurs through the thermal dissociation and subsequent reaction on nitrogen (N_2) and oxygen (O_2) in the combustion air. Most NOx formed through the thermal NOx mechanism occurs in the high temperature flame zone near the burners. The formation of thermal NOx is affected by three furnace-zone factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these three factors increase, NOx emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas fired furnaces. Emission levels vary considerably with the type and size of combustor and with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

EPA's RBLC was used to perform a search of all nationally permitted control technologies for natural gas and hydrogen fired boilers of similar size and duty. Based on the RBLC search results, the lowest permitted emission rates nationally are:

- 0.009 lb NOx/MM BTU for Natural Gas Combustion using LNB

Shintech proposes to match the above emission rates with the following LAER:

- 0.009 lb NOx/MM BTU for Natural Gas Combustion using LNB and SCR

Gas Thermal Oxidizers EQT0126 and EQT0127 (EPN 2M-5 & 2M-6)

The Gas Thermal Oxidizers are used to dispose of waste gas combustible organic compounds from the process. The method of disposal is to oxidize organic compounds to carbon dioxide and water. When chlorinated organic compounds are part of the waste gas stream, the products of complete combustion include hydrochloric acid (HCl). The HCl will be removed by an HCl scrubber. Thermal oxidation provides safe, effective, and efficient control of almost any organic stream, provided that it is properly designed and maintained.

The heart of the thermal oxidizers is a nozzle-stabilized flame maintained by a combination of auxiliary fuel (natural gas), waste gas, and supplemental air. Upon passing through the flame, the waste gas is heated from its inlet temperature to its ignition temperature. Any organic stream and air mixture will ignite if its temperature is raised to a sufficiently high level. Therefore, the level of VOC control is determined by the residence time and temperature in the thermal oxidizer combustion chamber.

Pollutants that can be expected from the thermal oxidizers include products of combustion, i.e. PM_{10} and NOx, and products of incomplete combustion, i.e. CO and VOC.

EPA's RBLC was used to perform a search of permitted thermal oxidizers in similar industrial uses. Based on the RBLC search results, the lowest permitted emission rate nationally is:

- 0.025 lb NOx/MM BTU

Shintech proposes to match or surpass the above emission rates with the following BACT:

- 0.02 lb NOx/MM BTU

B. ANALYSIS OF EXISTING AIR QUALITY

Prevention of Significant Deterioration regulations require an analysis of existing air quality for those pollutants emitted in significant amounts from a proposed facility.

This modeling analysis was conducted for PM_{10}, CO, and NO_2. For those pollutants to be modeled, the impacts due to the contemporaneous net increase from the project (in this case, the entire allowable emission rates) were modeled to determine if the emissions increase results in a significant impact. Therefore the resulting concentrations were compared to corresponding modeling significance level (MSL) for each pollutant

modeled and the corresponding average period.

Modeled concentrations of PM_{10}, CO and NO_2 for each averaging period were less than the MSL; therefore, a full impact analysis was not required.

The toxics air quality dispersion modeling analysis was conducted in accordance with the approved air quality dispersion modeling protocol. For all TAPs other than vinyl chloride, the modeling results show that there were no ambient air impacts greater than ambient air standard (AAS), demonstrating compliance with LAC 33:III.5109.B. Vinyl chloride modeling results show that there were nine receptors with ambient air impacts greater than the AAS. The receptors are located along Evergreen Road and at a restricted public access cemetery located off Evergreen Road to the East of the Georgia Gulf Facility.

The vinyl chloride AAS is based on an annual average. Since the receptor locations are in areas that are uninhabited and restricted access, long-term exposure to vinyl chloride is not expected. Additionally, modeling results show that the Shintech facility's contributions to the vinyl chloride inpacts are relatively minor. A neighboring facility's vinyl chloride contributions to the nine receptors make up a significant portion of the predicted concentrations.

As per LAC33:III.5109.B.2.a-c, the modeling effort shows that Shintech's facility will not adversely impact the ambient air quality.

C. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ANALYSIS

Refined modeling showed that PM_{10}, CO and NO_X emissions from the proposed plant will not cause or contribute to any NAAQS exceedances.

D. PSD INCREMENT ANALYSIS

Computer modeling indicated that PSD increment allowances for PM_{10}, CO and NO_X will be preserved.

E. SOURCE RELATED GROWTH IMPACTS

Operation of this facility is not expected to have any significant effect on residential growth or industrial/commercial development in the area of the facility. No significant net change in employment, population, or housing will be associated with the project. As a result, there will not be any significant increases in pollutant emissions indirectly associated with Shintech Louisiana LLC's proposal. Secondary growth effects will include temporary construction related jobs and approximately 100 permanent jobs.

PRELIMINARY DETERMINATION SUMMARY

Shintech Louisiana LLC – Shintech Plaquemine Plant 2
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731
February 29, 2008

F. SOILS, VEGETATION, AND VISIBILITY IMPACTS

There will be no significant impact on area soils, vegetation, or visibility.

G. CLASS I AREA IMPACTS

Louisiana's Breton Wildlife Refuge, the nearest Class I area, is over 100 kilometers from the site, precluding any significant impact.

H. TOXIC EMISSIONS IMPACT

The selection of control technology based on the BACT analysis did not include consideration of control of toxic emissions.

V. CONCLUSION

The Air Permits Division has made a preliminary determination to approve the construction of the facility at the Shintech Louisiana LLC - Plaquemine PVC Plant near Plaquemine, in Iberville Parish, Louisiana, subject to the attached specific and general conditions. In the event of a discrepancy in the provisions found in the application and those in this Preliminary Determination Summary, the Preliminary Determination Summary shall prevail.

SPECIFIC CONDITIONS

Shintech Louisiana LLC - Plaquemine PVC Plant
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731

1. The permittee is authorized to operate in conformity with the specifications submitted to the Louisiana Department of Environmental Quality (LDEQ) as analyzed in LDEQ's document entitled "Preliminary Determination Summary" dated February 29, 2008, and subject to the following emissions limitations and other specified conditions. Specifications submitted are contained in the application and Emission Inventory Questionnaire dated November 14, 2007, along with supplemental information dated February 12, 2008 and February 27, 2008.

MAXIMUM ALLOWABLE EMISSIONS RATES

ID No.	Description		PM_{10}	SO_2	NO_X	CO	VOC
EQT0112	2U-1 Utility Boilers &	lb/MM Btu	0.005	-	0.01	0.0362	0.0026
and	2U-2 Utility Boilers	lb/hr	1.25	0.19	3.05	10.86	0.78
EQT0113		TPY	5.48	0.68	11.13	39.64	2.85
EQT0120	2C-4 Cooling Tower	lb/M Gal	0.00008	-	-	-	-
		lb/hr	0.22				
		TPY	0.81				
EQT0128	2M-7 Cooling Tower	lb/M Gal	0.00006	-	-	-	-
		lb/hr	0.46				
		TPY	1.67				
EQT0122,	2M-1, 2M-2, 2M-3, & 2M-	lb/MM Btu	0.007	-	0.009	0.046	0.005
EQT0123,	4 – VCM Cracking	lb/hr	0.80	0.06	0.96	5.00	0.58
EQT0124,	Furnaces	TPY	2.94	0.23	3.50	18.26	2.13
and							
EQT0125							
EQT0126	2M-5 & 2M-6 – Gas	lb/MM Btu	0.0077	-	0.02	0.08	0.015
and	Thermal Oxidizers	lb/hr	0.55	0.03	1.40	6.10	1.10
EQT0127		TPY	2.43	0.12	6.15	26.74	4.81
EQT0115,	2U-5, 2U-6, 2C-6, and 2M-	lb/HP-hr					
EQT0116,	11 – Diesel Fired	(<600 HP)	0.0022	-	-	0.0067	-
EQT0121,	Emergency Engines	(>600 HP)	0.0007			0.0055	
and							
EQT0129							
FUG0006	2U-4 Fugitive Emissions	lb/hr	-	-	-	-	0.31
		TPY					1.13
FUG0008	2M-8 Fugitive Emissions	lb/hr	-	-	-	-	2.50
		TPY					10.95
FUG0009	2M-9 Fugitive Emissions	lb/hr	-	-	-	-	3.42
		TPY					0.36
FUG0010	2M-10 Fugitive Emissions	lb/hr	-	-	-	-	0.39
		TPY					0.82

2. Permittee shall comply with a streamlined equipment leaks monitoring program. Compliance with the streamlined program in accordance with this specific condition shall serve to comply with each of the fugitive emission monitoring programs being streamlined, as indicated in the following table. Noncompliance with the streamlined program in accordance with this specific condition may subject the permittee to enforcement action for one of the applicable fugitive emissions programs.

SPECIFIC CONDITIONS

Shintech Louisiana LLC - Plaquemine PVC Plant
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731

a. Streamlined program shall be applicable to the combined universe of components subject to any of the programs being streamlined. Any component type which does not require periodic monitoring under the overall most stringent program shall be monitored as required by the most stringent program being streamlined and will not be exempted. The streamlined program will include any exemptions based on size or component available in any of the programs being streamlined.

b. Leak definitions and monitoring frequency shall be used based on the overall most stringent program. Percent leaker performance shall be calculated using the provisions of the overall most stringent program. Annual monitoring shall be defined as once every four quarters. Some allowance may be made in the first year on the streamlined program in order to allow for transition from existing monitoring schedules.

c. Permittee shall comply with recordkeeping and reporting requirements of the overall most stringent program. Semiannual reports shall be submitted on September 30 and March 31, to cover the periods from January 1 through June 30 and July 1 through December 31, respectively. The semiannual reports shall include any monitoring performed within the reporting period.

d. The streamlined program shall not be used to replace the continuous monitoring requirements of 40 CFR 61.65(b)(8)(i).

Unit or Plant Site	Programs Streamlined	Stream Applicability	Overall Most Stringent Program
EDC/VCM Unit	40 CFR 63 Subpart H	5% VOHAP	40 CFR 63 Subpart H
	LAC 33:III.2122	10% VOC	
	LAC 33:III.5109	TAP	

LOUISIANA AIR EMISSION PERMIT
GENERAL CONDITIONS

I. This permit is issued on the basis of the emissions reported in the application for approval of emissions and in no way guarantees that the design scheme presented will be capable of controlling the emissions to the type and quantities stated. Failure to install, properly operate and/or maintain all proposed control measures and/or equipment as specified in the application and supplemental information shall be considered a violation of the permit and LAC 33:III.501. If the emissions are determined to be greater than those allowed by the permit (e.g. during the shakedown period for new or modified equipment) or if proposed control measures and/or equipment are not installed or do not perform according to design efficiency, an application to modify the permit must be submitted. All terms and conditions of this permit shall remain in effect unless and until revised by the permitting authority.

II. The permittee is subject to all applicable provisions of the Louisiana Air Quality Regulations. Violation of the terms and conditions of the permit constitutes a violation of these regulations.

III. The Emission Rates for Criteria Pollutants, Emission Rates for TAP/HAP & Other Pollutants, and Specific Requirements sections or, where included, Emission Inventory Questionnaire sheets establish the emission limitations and are a part of the permit. Any operating limitations are noted in the Specific Requirements or, where included, Tables 2 and 3 of the permit. The synopsis is based on the application and Emission Inventory Questionnaire dated November 14, 2007, along with supplemental information dated February 12, 2008 and February 27, 2008.

IV. This permit shall become invalid, for the sources not constructed, if:

A. Construction is not commenced, or binding agreements or contractual obligations to undertake a program of construction of the project are not entered into, within two (2) years (18 months for PSD permits) after issuance of this permit, or;

B. If construction is discontinued for a period of two (2) years (18 months for PSD permits) or more.

The administrative authority may extend this time period upon a satisfactory showing that an extension is justified.

This provision does not apply to the time period between construction of the approved phases of a phased construction project. However, each phase must commence construction within two (2) years (18 months for PSD permits) of its projected and approved commencement date.

V. The permittee shall submit semiannual reports of progress outlining the status of construction, noting any design changes, modifications or alterations in the construction schedule which have or may have an effect on the emission rates or ambient air quality levels. These reports shall continue to be submitted until such time as construction is certified as being complete. Furthermore, for any significant change in the design, prior approval shall be obtained from the Office of Environmental Services, Air Permits Division.

VI. The permittee shall notify the Department of Environmental Quality, Office of Environmental Services, Air Permits Division within ten (10) calendar days from the date that construction is certified as complete and the estimated date of start-up of operation. The appropriate Regional Office shall also be so notified within the same time frame.

VII. Any emissions testing performed for purposes of demonstrating compliance with the limitations set forth in paragraph III shall be conducted in accordance with the methods described in the Specific Conditions and, where included, Tables 1, 2, 3, 4, and 5 of this permit. Any deviation from or modification of the methods used for testing shall have prior

approval from the Office of Environmental Assessment, Air Quality Assessment Division.

VIII. The emission testing described in paragraph VII above, or established in the specific conditions of this permit, shall be conducted within sixty (60) days after achieving normal production rate or after the end of the shakedown period, but in no event later than 180 days after initial start-up (or restart-up after modification). The Office of Environmental Assessment, Air Quality Assessment Division shall be notified at least (30) days prior to testing and shall be given the opportunity to conduct a pretest meeting and observe the emission testing. The test results shall be submitted to the Air Quality Assessment Division within sixty (60) days after the complete testing. As required by LAC 33:III.913, the permittee shall provide necessary sampling ports in stacks or ducts and such other safe and proper sampling and testing facilities for proper determination of the emission limits.

IX. The permittee shall, within 180 days after start-up and shakedown of each project or unit, report to the Office of Environmental Compliance, Enforcement Division any significant difference in operating emission rates as compared to those limitations specified in paragraph III. This report shall also include, but not be limited to, malfunctions and upsets. A permit modification shall be submitted, if necessary, as required in Condition I.

X. The permittee shall retain records of all information resulting from monitoring activities and information indicating operating parameters as specified in the specific conditions of this permit for a minimum of at least five (5) years.

XI. If for any reason the permittee does not comply with, or will not be able to comply with, the emission limitations specified in this permit, the permittee shall provide the Office of Environmental Compliance, Enforcement Division with a written report as specified below.

A. A written report shall be submitted within 7 days of any emission in excess of permit requirements by an amount greater than the Reportable Quantity established for that pollutant in LAC 33.I.Chapter 39.

B. A written report shall be submitted within 7 days of the initial occurrence of any emission in excess of permit requirements, regardless of the amount, where such emission occurs over a period of seven days or longer.

C. A written report shall be submitted quarterly to address all emission limitation exceedances not included in paragraphs A or B above. The schedule for submittal of quarterly reports shall be no later than the dates specified below for any emission limitation exceedances occurring during the corresponding specified calendar quarter:

1. Report by June 30 to cover January through March
2. Report by September 30 to cover April through June
3. Report by December 31 to cover July through September
4. Report by March 31 to cover October through December

D. Each report submitted in accordance with this condition shall contain the following information:

1. Description of noncomplying emission(s);
2. Cause of noncompliance;
3. Anticipated time the noncompliance is expected to continue, or if corrected, the duration of the period of noncompliance;
4. Steps taken by the permittee to reduce and eliminate the noncomplying emissions; and

5. Steps taken by the permittee to prevent recurrences of the noncomplying emissions.

E. Any written report submitted in advance of the timeframes specified above, in accordance with an applicable regulation, may serve to meet the reporting requirements of this condition provided all information specified above is included. For Part 70 sources, reports submitted in accordance with Part 70 General Condition R shall serve to meet the requirements of this condition provided all specified information is included. Reporting under this condition does not relieve the permittee from the reporting requirements of any applicable regulation, including LAC 33.I.Chapter 39, LAC 33.III.Chapter 9, and LAC 33.III.5107.

XII. Permittee shall allow the authorized officers and employees of the Department of Environmental Quality, at all reasonable times and upon presentation of identification, to:

A. Enter upon the permittee's premises where regulated facilities are located, regulated activities are conducted or where records required under this permit are kept;

B. Have access to and copy any records that are required to be kept under the terms and conditions of this permit, the Louisiana Air Quality Regulations, or the Act;

C. Inspect any facilities, equipment (including monitoring methods and an operation and maintenance inspection), or operations regulated under this permit; and

D. Sample or monitor, for the purpose of assuring compliance with this permit or as otherwise authorized by the Act or regulations adopted thereunder, any substances or parameters at any location.

XIII. If samples are taken under Section XII.D. above, the officer or employee obtaining such samples shall give the owner, operator or agent in charge a receipt describing the sample obtained. If requested prior to leaving the premises, a portion of each sample equal in volume or weight to the portion retained shall be given to the owner, operator or agent in charge. If an analysis is made of such samples, a copy of the analysis shall be furnished promptly to the owner, operator or agency in charge.

XIV. The permittee shall allow authorized officers and employees of the Department of Environmental Quality, upon presentation of identification, to enter upon the permittee's premises to investigate potential or alleged violations of the Act or the rules and regulations adopted thereunder. In such investigations, the permittee shall be notified at the time entrance is requested of the nature of the suspected violation. Inspections under this subsection shall be limited to the aspects of alleged violations. However, this shall not in any way preclude prosecution of all violations found.

XV. The permittee shall comply with the reporting requirements specified under LAC 33:III.919 as well as notification requirements specified under LAC 33:III.927.

XVI. In the event of any change in ownership of the source described in this permit, the permittee and the succeeding owner shall notify the Office of Environmental Services in accordance with LAC 33:I.Chapter 19.Facility Name and Ownership/Operator Changes Process.

LOUISIANA AIR EMISSION PERMIT
GENERAL CONDITIONS

XVII. Very small emissions to the air resulting from routine operations, that are predictable, expected, periodic, and quantifiable and that are submitted by the permitted facility and approved by the Air Permits Division are considered authorized discharges. Approved activities are noted in the General Condition XVII Activities List of this permit. To be approved as an authorized discharge, these very small releases must:

1. Generally be less than 5 TPY
2. Be less than the minimum emission rate (MER)
3. Be scheduled daily, weekly, monthly, etc., or
4. Be necessary prior to plant startup or after shutdown [line or compressor pressuring/depressuring for example]

These releases are not included in the permit totals because they are small and will have an insignificant impact on air quality. This general condition does not authorize the maintenance of a nuisance, or a danger to public health and safety. The permitted facility must comply with all applicable requirements, including release reporting under LAC 33:I.3901.

XVIII. Provisions of this permit may be appealed in writing pursuant to La. R.S. 30:2024(A) within 30 days from receipt of the permit. Only those provisions specifically appealed will be suspended by a request for hearing, unless the secretary or the assistant secretary elects to suspend other provisions as well. Construction cannot proceed except as specifically approved by the secretary or assistant secretary. A request for hearing must be sent to the following:

Attention: Office of the Secretary, Legal Services Division
La. Dept. of Environmental Quality
Post Office Box 4302
Baton Rouge, Louisiana 70821-4302

XIX. For Part 70 sources, certain Part 70 general conditions may duplicate or conflict with state general conditions. To the extent that any Part 70 conditions conflict with state general conditions, then the Part 70 general conditions control. To the extent that any Part 70 general conditions duplicate any state general conditions, then such state and Part 70 provisions will be enforced as if there is only one condition rather than two conditions.

TABLE I: BACT COST SUMMARY

Shintech Louisiana LLC - Plaquemine PVC Plant
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731

Control Alternatives		Availability/ Feasibility	Negative Impacts (a)	Control Efficiency	Emissions Reduction (TPY)	Capital Cost ($)	Annualized Cost ($)	Cost Effectiveness ($/ton)	Notes
	(N/A)								

Notes: a) Negative impacts: 1) economic, 2) environmental, 3) energy, 4) safety

TABLE II: AIR QUALITY ANALYSIS SUMMARY

Shintech Louisiana LLC - Plaquemine PVC Plant
Agency Interest No.: 126578
Shintech Louisiana LLC
Plaquemine, Iberville Parish, Louisiana
PSD-LA-731

Pollutant	Averaging Period	Preliminary Screening Concentration ($\mu g/m^3$)	Level of Significant Impact ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)	Maximum Modeled Concentration ($\mu g/m^3$)	Modeled + Background Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Modeled PSD Increment Consumption ($\mu g/m^3$)	Allowable Class II PSD Increment ($\mu g/m^3$)
PM_{10}	24-hour	3.72	5	10	NR	NR	NR	150	NR	30
	Annual	0.63	1	-	NR	NR	NR	50	NR	17
NO_X	Annual	0.75	1	14	NR	NR	NR	100	NR	25
CO	1-hour	226.95	2000	-	NR	NR	NR	40,000	NR	-
	8-hour	105.01	500	575	NR	NR	NR	10,000	NR	-

NR = Not required.